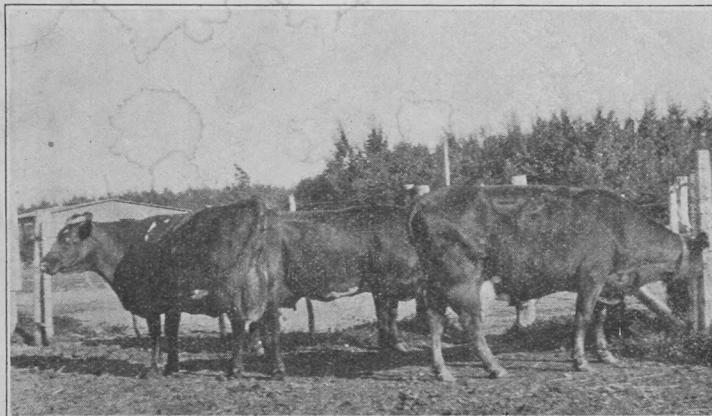


ALTERNATIVES TO GRAIN GROWING IN THE PRAIRIE PROVINCES

An Address delivered at The Western Canada Live Stock Union meeting, Moose Jaw, Sask., January 18, and Saskatchewan Agricultural Societies Convention, Saskatoon, January 19, 1934,
by

A. M. SHAW

Dean of Agriculture, University of Saskatchewan.



Cows of this type—that will produce both beef and milk—are the most profitable kind for the average farmer to keep.

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FOREWORD

ON JANUARY 18th, 1934, at the Convention of the Western Canadian Live Stock Union, held at Moose Jaw, Saskatchewan, a large number of farmers and business men had the opportunity of hearing an address by Dean A. M. Shaw of the University of Saskatchewan on "Alternatives to Grain Growing in the Prairie Provinces." The fine reception given this address by those present, all being men vitally interested in agricultural problems, led to asking Dean Shaw's permission to give the address a wider circulation. This permission was graciously given.

We are certain that you will be pleased to find that Dean Shaw is not talking restrictions, quotas, or any untried scheme for the farmers to follow. It is realized that there must be some changes, and also that whatever changes come, the farmer must still produce on his land grains and feeds of different kinds, and these feeds and grains must be disposed of in some way. The "Alternatives" spoken of by Dean Shaw seem to indicate a real way of "carrying on" successfully.

HARVEY O. POWELL

Dominion Agricultural Credit Co., Ltd.
Regina, Sask.

March 10, 1934.

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Since the signing of the Wheat Agreement in August, 1933, a great deal has been written in connection with it; but, in all this discussion, very little has been said by those who are in favor of drastic curtailment of wheat production about **alternative activities in which Western farmers might engage.**

To some of them, the mere signing of the Agreement seems to be the all-important thing and now that that is done, the difficulties in connection with the wheat situation will straightway disappear, while others are content to make the suggestion that the idle acres may be summerfallowed or seeded down to grass or vaguely suggest that they simply be used for some other purpose.

To me, the attitude that the restrictive measures in themselves as indicated in the Wheat Agreement, if carried out, will solve the present marketing difficulties, indicates a lack of understanding and appreciation of the **tremendous agricultural potentialities of Western Canada.**

I do not, however, propose to discuss the Wheat Agreement at this time, either as an agreement or as to how it may be implemented, but am taking for granted that it will in due course be put into effect by those who are responsible for it. Instead, I wish to examine in some detail any alternatives to grain growing which may be of immediate interest to the farmers of Western Canada.

Are there any alternatives? The answer to this question is to be found in a correct analysis of the natural conditions that obtain in the region under discussion. Scientific research and experimental evidence, backed by long years of practical farming experience, have shown clearly that, in general, the production of the cereal grains is by far the most successful form of agricultural production on the arable lands of the

Western Prairies. This is entirely due to natural conditions and natural conditions cannot be ignored with impunity. For instance, an analysis of the soil of certain areas in the north-eastern part of Saskatchewan would be almost identical with a similar analysis of soils in many of the counties of Iowa or Illinois, yet the same crops cannot be grown equally well in the two areas. In Iowa or Illinois, corn may be grown commercially, immense yields are obtained, whereas the oat crop is inferior both as to yield and quality. In Northern Saskatchewan, however, oats may be grown to perfection often yielding from 60 to 90 bushels per acre and weighing regularly from 40 to 44 pounds to the bushel, while the growing of corn as a commercial crop in the same area results in total failure.

Why is this so? It is simply due to a difference in climate, mainly during the growing season; corn requiring high temperature with a relatively high humidity, whereas oats thrive best in areas where relatively low temperatures prevail during the growing season. It is obvious, therefore, that farmers living in Northern Saskatchewan could not expect to succeed by endeavoring to grow corn instead of oats nor can the farmers of Iowa find success by changing from a corn-hog production programme in favor of the growing of cereal grains.

The climate of a country exerts a far greater influence over the kind of agriculture that may be successfully practised in any given region than does the soil. Evidence of this is to be found on every hand. The following figures may serve to illustrate the point. The export of grassland products to the British Dominions constitute 94 per cent of the total exports of New Zealand, 17 per cent represents the amount of grassland products exported by Canada, while 64 per cent of the agricultural production of Great Britain is derived directly from its pastures.

This preponderance of grassland products in New Zealand and Great Britain is directly due to climatic conditions which in both of these countries are eminently favorable to the growth of pasture, hay and forage crops; while the comparatively low percentage of grassland products produced by Canada is again due largely to climatic conditions which in Western Canada at any rate cannot be considered as being particularly suited to the production of grassland products, but on the other hand, exceptionally favorable to the production of the cereal grains. It is therefore evident that the conditions that ensure the production of the very highest quality in cereals may be inhibiting factors as far as grassland production is concerned.

This does not mean of course that some modification of existing farm practices may not be made. Certain areas may do much in this

direction. For instance, most of Manitoba, the whole of Eastern and Northern Saskatchewan and Central and Northern Alberta can produce the coarse grains successfully in competition with, or as an alternative to wheat. This area also includes that portion of Western Canada where the tame grasses, legumes and forage crops may be grown with some assurance of success. On the other hand, there are many millions of acres in the Southern and Central parts of these Provinces where the natural conditions permit of practically no alternative to the growing of the bread grains.

If restriction of wheat acreage is deemed to be the only way to solve our wheat marketing difficulties, and I am by no means convinced that it is the only way or necessarily the best way, it would seem logical that, in districts capable of producing the finest quality of wheat and where no satisfactory alternative is possible, restrictive measures should not apply, but rather they should apply in other parts of Canada, East or West, where inferior wheats are being produced and by the same token where alternative crops can be successfully grown.

It would appear, therefore, to be amply clear that the finding of complete and satisfactory alternatives to the practice of grain growing on the Prairies is by no means promising. In fact, the available evidence seems to indicate that the producing of grain must continue to be the major activity on the arable lands of Western Canada.

This being the case, any permanent curtailment in the production of grain on other than marginal lands will spell ruin for large numbers of farmers and tend to force many of them on to a subsistence basis or out of the picture entirely. This would prove to be a disaster of the first magnitude, firstly to the Western Provinces themselves and secondly to the whole of Canada. This fact becomes particularly apparent when one realizes that by far the greatest single source of revenue received by the Canadian Railways is derived from the handling of the Western grain crop plus the handling of various commodities which the same grain buys either in Eastern Canada or abroad. In other words, **the sale of our agricultural products abroad is the largest single factor in determining the wealth and prosperity of Canada.**

In my opinion, it is just as difficult to justify enforced restrictive measures when applied to sound agricultural production carried on under suitable natural conditions as it is to justify the principle of subsidies when applied to agricultural production when carried on under unsuitable natural conditions. Both of these methods are being tried in various

countries of the world at present, both of them, I believe, are economically unsound, and because of that fact, the results hoped for are not possible of achievement.

If then the production of grain is basic in prairie agriculture, and I firmly believe that it is, what must be done in the face of the marketing difficulties with which we are confronted? May not the solution to this problem be found in the method of marketing this basic commodity? Up to the present, it has been considered as a problem of marketing a raw material; grain sold in its natural state. Is it not possible that a part, possibly a very large part of it, might be marketed in the form of livestock and livestock products? This immediately presupposes, first, that we can produce livestock successfully under our conditions and, second, that we will be able to sell the resultant product.

Our first consideration then is to select the kind of livestock that can make the most efficient use of our basic commodity, viz., grain, and at the same time, provide us with products that are in demand and can be sold on the export markets, for it must always be kept in mind that livestock is largely being kept for the purpose of assisting with marketing of our grains, and has to be marketed in the same way, viz., via the export route.

As all livestock production must be based upon adequate supplies of food and water and as all the animal foods are derived from plants and their products, it is again necessary to study the natural conditions that prevail in the area under discussion in order to correctly analyse the situation as far as animal production is concerned.

I have already pointed out that there are many millions of acres in these provinces where the best of our wheat is grown but where because of climatic conditions, other types of agriculture cannot be engaged in with success. These same areas have an additional handicap and that is a general lack of water in sufficient quantities to provide for more than the bare requirements of the work stock and the few additional animals necessary to provide for living requirements on the farm. Another drawback to these same areas from a livestock standpoint is that again, because of the vagaries of climate, they are subject at intervals to partial or even complete crop failures. Where these conditions prevail, large-scale livestock enterprises will prove to be unsuitable and consequently unprofitable.

There are other large areas, however, which I have already referred to including roughly the Eastern, North Central and Northern portions of these Canadian Prairies that are reasonably well watered and that are

not nearly as subject to crop failures or even partial crop failures and that can be relied upon to produce abundant annual crops of pasture, hay, forage and coarse grains; areas, in fact, where alternatives to wheat growing exist. These are the only districts where farm livestock enterprises can be undertaken with a reasonable assurance of success, again for the same reasons, viz., the fundamentals are right, the hazards are reduced to a minimum, and the farmer can go forward without the constant fear of disaster overtaking him due to the risk of crop failure which is ever present in less favored areas.

This brings us to the actual **selection of the livestock activities that will best fit in to this agricultural background**. Keeping in mind, then, that under the natural conditions that prevail in these prairies which tend to make us short of pasture, short of hay, and short on the nitrogenous or protein-rich feeds in general, but long on medium and low grade roughages and long on grain and carbonaceous feeds in general and that water is plentiful in some areas; in others, relatively scarce and in still others, entirely insufficient, I will endeavour to list the livestock activities in what I consider to be their order of importance.

First,—I would suggest that poultry, mainly chickens and turkeys be given first consideration for the following reasons:

1. Our natural conditions are entirely suitable for the development of this industry. Nowhere in Canada are the climatic conditions more favorable for the development of the poultry industry than on these Western plains.
2. They are probably the only class of farm livestock that could be kept with profit on every single farm. The reason being that poultry are more adaptable and not governed so completely by production practice on the farms as other classes of livestock.
3. They furnish suitable and readily available products in the form of eggs and meat for the farmers' table.
4. They utilize much material on a farm that could not be profitably consumed by any other kind of livestock.
5. They are large consumers of grain. The poultry of Canada last year consumed in grain the equivalent of the output from 1,000,-000 acres of good wheat land.
6. Their products, eggs and dressed birds, are both acceptable and saleable on the export market.

Secondly,—I would suggest cattle raising which I have placed second simply because it can never be quite as universally engaged in as poultry raising, but which is in my opinion by far the most important livestock

activity in which Western grain farmers may engage, it being in turn basic to the bacon and butter and cheese trade. I would definitely choose cattle of the beef and dual-purpose types, cattle from which the revenue would be derived from meat with milk production a somewhat secondary consideration.

It is important how this business of cattle raising on farms be carried on in order that it shall prove to be not only profitable to the individual operator, but completely satisfactory as a means of marketing farm crops, particularly grains. To determine this point, I have made some careful comparisons of herds of like numbers, but varying in type and capacities and kept under several systems of management.

A herd of ten grade cows and one purebred bull was taken as the unit although, in actual practice, of course the numbers in the herd would naturally vary with conditions but would I believe usually be less than ten rather than more.

(1) The first illustration is a herd of ten **GRADE DAIRY TYPE** cows and one **PUREBRED DAIRY BULL** kept for the production and sale of fluid milk.

The income derived from this type of enterprise is more difficult to calculate than in any of the other four cases considered as there is a great variation in trucking charges, labor cost, feed cost, etc. It will be assumed, however, that the dairy herd of ten cows is kept on a **farm about five to ten miles from the marketing centre**, that the farm will raise sufficient feed for the herd and that the farmer and his family supply the necessary labor so that the income will represent profits plus returns for labor as in the other cases cited.

The farmer, unless he retails, must ship his milk daily to some distributing plant. In order to make this example comparable with the other four, it will be assumed that only nine cows freshen per annum. No calves, either males or females, would be raised on the farm, but would be sold. The bull, therefore, could be used as long as he was serviceable, making the annual charge per cow the same as in the case of the beef herds. Depreciation would have to be charged against the cows in this case as no heifers would be raised. Annual milk yield per cow will be taken as 7,000 lbs. with 250 lbs. of butterfat. The calculations are based on an average price per pound butterfat of 46.2c. If, however, the shipper at any time is paid for part of his milk as surplus, his average price would immediately be lowered, possibly by one-quarter to one-third of the contract price used.

STATEMENT OF RECEIPTS AND EXPENDITURES OF No. 1 GROUP

Annual Receipts	Returns based on 1932 prices	Returns based on Average Price 10 yrs 1923-32
63,000 lbs. whole milk containing		
2,250 lbs. B.F. @ 46.2c per lb.	\$ 1,039.50	@ 63.7 \$ 1,433.25
Nine calves @ \$1.00 per head.....	9.00	@ 1.50 13.50
	<u>\$ 1,048.50</u>	<u>\$ 1,446.75</u>
Annual Expenditure		
Feed for 10 cows:	Costs based on 1932-33 prices	Costs based on Average Price 10 yrs. 1923-33
Roughage, 30 tons @ \$5.00.....	\$150.00	@ \$8.30 \$ 249.00
Grain, 10 tons @ \$10.00	100.00	@ 17.50 175.00
Pasture @ 50c per head per mo.	60.00	60.00
Depreciation @ \$5.00 per head per annum	50.00	@ 7.50 75.00
Bull, @ \$1.00 per per head per annum.....	10.00	@ 1.25 12.50
Trucking milk @ 25c per 100...	157.50	@ .30 189.00
	<u>527.50</u>	<u>\$ 760.50</u>
Surplus over feed.....	521.00	686.25
	<u>\$ 1,048.50</u>	<u>\$ 1,446.75</u>

N.B.—No charge has been made for labor or upkeep of buildings.

(2) The second is the same herd of ten GRADE DAIRY TYPE COWS and one PUREBRED DAIRY BULL kept under conditions where the SALE OF FLUID MILK was IMPOSSIBLE and the REVENUE is derived FROM the SALE of BUTTERFAT AND MEAT.

Although this is not one of the systems of management which would fit into the suggested scheme as the calves would not be suitable for feeding, nevertheless for purposes of comparison, it might be helpful to examine this case. The average production of the cows in this herd is 7,000 pounds of milk with 250 pounds butterfat.

In this case, if herd improvement with regard to milk yield is to be attempted, heifer calves will have to be kept and brought into the herd at two years of age or a little over. In order to allow of some selection, it will be assumed that the sex ratio is 100: 100, that four heifers

are kept so that one may be selected annually for replacements and three may be sold fresh at a little over two years of age. The dairy bull will have to be changed every two years to avoid inbreeding. At present prices, a two-year-old bull bought at \$80.00 after two years' use, will have a salvage of market value of about \$20.00, which means a loss of \$60.00 in two years, or a depreciation of \$30.00 per year, or a charge of \$3.00 per cow per annum. It is sometimes possible to keep a bull for three years or more to serve the older unrelated cows and breed his heifers to some other bull. The keep of the bull may be offset to some extent by outside service fees.

The calves in this case will have to be pail fed. Allowing, therefore, 300 pounds of whole milk and 1,200 pounds of separated milk to raise each calf to weaning age, that is, four months, this would require 2,700 pounds of whole milk and 10,800 lbs. of separated milk. The total milk yield from the nine cows assumed to be milking would be 63,000 pounds. There would be available, therefore, for sale the butterfat from 60,300 pounds, leaving 54,270 pounds of separated milk. Deducting from this amount 10,800 pounds needed for the calves, there would remain for sale 43,470 pounds of separated milk (cream taken to be 35 per cent butterfat).

STATEMENT OF RECEIPTS AND EXPENDITURES OF No. 2 GROUP

	Returns based on 1932-33 prices	Returns based on Average Price 10 yrs. 1923-33
Annual Receipts		
2,154 lbs. B.F. @ 13c.....	\$ 280.02	@ 28.5 \$ 613.89
4,347 gals. sep. milk @ 1c.....	43.47	@ 1.5 65.20
5 800-lb. fed calves @ 3c	120.00	@ 5.5 220.00
3 fresh 2-year old heifers @ \$30.00	90.00	@ 50.00 150.00
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	\$ 533.49	\$ 1,049.09
	<hr/>	<hr/>

	Costs based on 1932-33 prices	Costs based on Average Price 10 yrs. 1923-33
Annual Expenditures		
Feed for 10 cows—		

Roughage (for 200 days October- April) 30 tons @ \$5.00.....	\$ 150.00	@ 8.30 \$ 249.00
Grain (for 10 mos. lact. period) 10 tons @ \$10.00.....	100.00	@ 17.50 175.00
Pasture for 12 months @ 50c per mo.	60.00	60.00

Feed for 4 Yearling Heifers			
Roughage, 6 tons (200 days) @ \$5.00	30.00	@ 8.30	49.80
Grain, 1½ tons (200 days) @ \$10.00	12.50	@ 17.50	21.90
Pasture for 6 mos. @ 50c.....	12.00		12.00
Feed for 4 Heifer Calves for 200 days—			
Roughage, 4½ tons @ \$5.00.....	22.50	@ 8.30	37.35
Grain, 1 ton @ \$10.00.....	10.00	@ 17.50	17.50
Feed for 5 Calves in Feed Lot—			
Roughage, 7 tons @ \$5.00.....	35.00	@ 8.30	58.10
Grain, 4 tons @ \$10.00.....	40.00	@ 17.50	70.00
Bull	30.00		40.00
	\$ 502.00		\$ 790.65
Surplus over feed.....	31.49		258.44
	<hr/>		<hr/>
	\$ 533.49		\$ 1,049.09
	<hr/>		<hr/>

N.B.—No charge has been made for labor or upkeep of buildings.

(3) The third is a herd of GRADE BEEF OR DUAL-PURPOSE cows and one PUREBRED BEEF BULL kept under conditions where the entire revenue is derived from the sale of meat. None of the cows in this herd are hand milked.

This type of cattle raising is very similar to that on the range, the herd pasturing in summer and, in winter time, instead of having to depend on winter grazing, they would have access to straw piles and, in addition, be fed coarse low-grade roughages as required.

Grade beef heifers suitable for foundation stock can usually be procured on the public markets and will cost considerably less than grade dairy heifers of the same age. Range heifers would be quite suitable for foundation stock. These heifers should be bred to calve in the spring at the age of three years. The calves will suckle the cows until the late fall and might be creep-fed during this period to insure rapid gain. They should be put on feed, all of them, both heifers and steers, immediately after weaning and marketed when from 12 to 16 months of age, weighing from 800 to 1,000 pounds. Under this system of management, the bull need not be replaced, but may be used as long as serviceable, probably eight or nine years. The annual charge of \$1.00 per head per cow has been made to cover the difference in value between his purchase and sale price.

STATEMENT OF RECEIPTS AND EXPENDITURES OF No. 3 GROUP

	Returns based on 1932-33 prices			Returns based on Average Price 10 yrs. 1923-33
Annual Receipts				
Nine 800-lb. fed calves @ 4c.....	\$ 288.00	@\$ 7.35	\$ 529.20	
Annual Expenditures		Costs based on 1932-33 prices		Costs based on Average Price 10 yrs 1923-33
Feed for cows—				
Pasture for 12 mos. @ 50c per mo....	\$ 60.00		\$ 60.00	
Roughage, 5 tons @ \$5.00.....	25.00	@ \$8.30	41.50	
Feed for 9 calves in feed lot—				
Roughage, 11 tons @ \$5.00.....	55.00	@ 8.30	91.30	
Grain, 7 tons @ \$10.00.....	70.00	@ 17.50	122.50	
Pasture for 6 mos. for replacement				
heifer @ 50c per month.....	3.00		3.00	
Roughage, $\frac{1}{2}$ ton @ \$5.00.....	2.50	@ 8.30	4.15	
Bull	10.00			12.50
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	\$ 225.50		\$ 334.95	
Surplus over feed.....	62.50		194.25	
	<hr/>		<hr/>	
	\$ 288.00		\$ 529.20	

N.B.—No charge has been made for labor or upkeep of buildings.

(4) The fourth is a herd of GRADE BEEF OR DUAL-PURPOSE cows and one PUREBRED BEEF BULL kept under conditions where the revenue is derived from the sale of meat and butterfat. In this herd, FOUR OF THE COWS ARE MILKED, FOUR OF THE OTHERS RAISING TWO CALVES APIECE, one raising a single and one being dry.

This system of calf raising is quite common in Scotland and Northern England. The yield of the four cows that are handmilked would of course be lower than that of the dairy cows. Three thousand five hundred pounds of milk and 130 pounds of butterfat are figures used in the following statement. It has been assumed that no extra feed would be given to increase the milk flow, although the four cows might be milked a little longer than the calves would suckle the other five cows. From four cows, there would be available for sale butterfat and separated milk from 14,000 pounds of whole milk. Again, the entire calf crop is to be finished for baby beef as in No. 3.

STATEMENT OF RECEIPTS AND EXPENDITURES OF NO. 4 GROUP

	Returns based on 1932-33 prices		Returns based on Average Price 10 yrs. 1923-33
Annual Receipts			
Nine 800-lb. fed calves @ 4.....	\$ 288.00	@ \$7.35	\$ 529.20
520 lbs. B.F. @ 13c	67.60	@ 28.5	148.20
1,250 gals. separated milk of value fed to pigs @ 1c.....	12.50	@ 1.5	18.75
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	\$ 368.10		\$ 696.15
	<hr/>		<hr/>
Annual Expenditures—			
Feed for cows—			
Pasture for 12 mos. @ 50c per mo... \$ 60.00			\$ 60.00
Roughage, 5 tons @ \$5.00..... 25.00	@ \$8.30		41.50
Grain, 1½ tons for cows at \$10.00... 15.00	@ 17.50		26.25
Feed for 9 calves in feed lot—			
Roughage, 11 tons @ \$5.00..... \$ 55.00	@ 8.30	\$ 91.30	
Grain, 7 tons @ \$10.00..... 70.00			122.50
Pasture for 6 mos. for replacement heifer..... 3.00			3.00
Roughage, ½ ton @ \$5.00..... 2.50	@ 8.30		4.15
Bull..... 10.00			12.50
	<hr/>		<hr/>
	\$ 240.50		\$ 361.20
Surplus over feed..... 127.60			334.95
	<hr/>		<hr/>
	\$ 368.10		\$ 696.15
	<hr/>		<hr/>

N.B.—No charge has been made for labor or upkeep of buildings.

(5) The fifth is a herd of grade BEEF OR DUAL-PURPOSE cows and one PUREBRED BEEF BULL kept under conditions where the revenue is again derived from the sale of meat and butterfat, but the management somewhat different. In this case, ALL the COWS are TO BE MILKED and the CALVES PAIL FED.

In this case, the calves would be pail fed on whole milk for one month, then on separated milk for one month, then on separated milk for three months as in the second case cited. The average milk yield being the same as in No. 4, the total milk yield would be 31,500 pounds from the nine cows in milk. The calves would require 2,700 pounds of whole milk and 10,800 pounds of separated milk. There would be available, therefore, for sale butterfat from 28,000 pounds of whole milk, leaving

25,755 pounds of separated milk. Deducting from this amount 10,800 pounds needed for the calves, there would remain for sale 14,955 pounds of separated milk.

This system depends for its success on the skill of the operator in rearing calves by hand. Even under the best of management, the calves from this herd would not be completely finished at as early an age as those in groups 3 or 4. We have, therefore, given them a sale value of only three-quarters of that of the three preceding groups, viz., three cents per pound as compared with four cents per pound. Heifer calves of this class would make excellent replacement material for herds kept as No. 3, 4 or 5.

STATEMENT OF RECEIPTS AND EXPENDITURES OF NO. 5 GROUP

	Returns based on 1932-33 prices	Returns based on Average Price 10 yrs. 1923-33
Annual Receipts		
Nine 800-lb. fed calves @ 3c.....	\$ 216.00	@ 5.50 \$ 396.00
1,066 lbs. B.F. @ 13c.....	138.58	@ 28.50 303.81
1,495 gals. sep. milk @ 1c.....	14.95	@ 1.5 22.43
	<hr/> \$ 369.53	<hr/> \$ 722.24
Annual Expenditures		
Feed for cows—		
Pasture for 12 mos. @ 50c per mo....	\$ 60.00	\$ 60.00
Roughage, 5 tons @ \$5.00.....	25.00	@ 8.30 41.50
Grains, 2 tons @ \$10.00.....	20.00	@ 17.50 35.00
Feed for 9 calves in feed lot—		
Roughage, 11 tons @ \$5.00.....	55.00	@ 8.30 91.30
Grain, 7 tons @ \$10.00.....	70.00	@ 17.50 122.50
Pasture for 6 mos. for replacement		
heifer.....	3.00	3.00
Roughage, $\frac{1}{2}$ ton.....	2.50	4.15
Bull.....	10.00	12.50
	<hr/> \$ 245.50	<hr/> \$ 369.95
Surplus over feed.....	124.03	352.29
	<hr/> \$ 369.53	<hr/> \$ 722.24

N.B.—No charge has been made for labor or upkeep of buildings.

In analysing these five systems of management, we find that No. 1 herd which is comprised of grade dairy cows, kept for the production and sale of fluid milk, produces the greatest revenue. This business of supplying the urban milk trade is so limited that it cannot be adopted by farmers generally. It, therefore, need not be considered here.

No. 2 herd is the same as No. 1 except that butterfat is sold instead of whole milk. The net revenue over feed in 1932 of this herd is the lowest of them all, the reason being apparently that, owing to excessive specialization, the dairy types have lost practically all value when considered from a beef standpoint and because of this can only be made to return a profit when kept for the production and sale of fluid milk.

No. 3 herd is composed of grade beef or dual-purpose cows kept solely for the production of beef calves, which are finished as baby beef. The net revenue over feed in 1932 from this herd is considerably larger than from No. 2. The finished beef in this case will be of first quality and entirely suitable but no skim-milk is being produced and, therefore, pig raising as a sideline is made much more difficult. Overhead and labor cost, however, will be found to be the lowest.

No. 4 herd is composed of beef or dual-purpose cows, but in this case four of them are milked and the calves doubled up on others. By this method, an added revenue is derived from the sale of butterfat. It also ensures adequate quantities of skim-milk for the proper quota of bacon pigs for the farm. The calves will be, if creep-fed, practically equal to the calves from the cows in No. 3 herd.

The net revenue over feed in 1932 in this case is practically twice that derived from No. 3 herd and four times that derived from No. 2.

No. 5 is the same herd, but in this case, all the cows are hand milked and the calves pail fed. The revenue here is about the same as in the previous case. This method has the disadvantage, however, of higher costs particularly for labor. The calves raised by hand are not so acceptable for market purposes and, although large quantities of skim-milk are produced, the calf feeding which is an essential part of this system is in direct competition with pig raising and, in almost every case, will be detrimental to the latter.

It would seem reasonably clear, therefore, that, of all these methods, the one which comes nearest to our requirements is to be found in No. 4.

By the method outlined, it is possible to produce beef of the highest quality, butterfat in reasonable quantities together with the requisite quantity of skim-milk to carry on pig raising to the full capacity of the farm. It provides the means of utilizing the maximum quantity of grain and the three products, viz., beef, bacon and butter, are the three that can be sold to best advantage. The reason that this method shows the

greatest returns is again because it fits into the conditions that obtain on Western farms better than any of the others.

In actual operation, it would work something like this: Ten two-year-old grade heifers would be purchased at so much per pound. They would be pasture bred to freshen in the early spring. Several of them would be milked throughout the season, their calves being raised by the other cows. The calves could either run with the cows or, **better still**, be kept in a shed and the cows turned in to them twice daily. This method makes better calves as they are protected from the flies and learn to eat grain from troughs at an early age. The calves are weaned in the fall and immediately put on feed and carried along until finished at twelve to sixteen months, weighing 800 to 1,000 pounds. They would, under this system, require the minimum of hay and pasture and the maximum of grain. The dry cows would be wintered at stacks and fed low grade roughage as required. All the calves, both heifers and steers, go into the feed lot to be finished. This is repeated as long as the original herd lasts, which ordinarily would be until they were ten or eleven years of age. The same bull could be used year after year as long as he was serviceable. When the cows are worn out, they can be sent to market and a new group of heifers purchased. As a rule, there is a correlation between the salvage values of aged beef cows and young stock heifers on the public markets. For instance, a beef cow weighing 1,400 pounds, if sold, might bring one cent per pound. On the same market on the same day, thin heifers weighing 700 pounds could be purchased for two cents per pound. At higher prices, the correlation still exists.

This is where the beefy sort of cows have a decided advantage over the dairy types. The dairy cow, when worn out is practically valueless, but a heifer to replace her is invariably purchased not by the pound but by the head, a highly speculative and usually costly basis.

Besides furnishing all the requirements necessary, the system as outlined in No. 4 plan, has the great advantage of being flexible. In case of feed shortage, the calves may be sold at weaning time either on the market or to someone else to finish or, if necessary, the whole herd may be disposed of without undue loss as the enterprise is founded on a sound commercial basis.

You will note I have referred entirely to grade cows. I did this purposely as grade commercial cows are the only kind the average farmer should keep. **The bull should, however, always be a purebred and a good individual.** The breeding of registered cattle should be left to the professional breeder, the man with a special liking and aptitude for the business and who can afford to undertake the risks which are ever present in carrying on what is usually a highly capitalized enterprise.

Swine raising for the production of bacon goes naturally with cattle raising on farms. In fact, I am not at all sure that large scale production of bacon can be secured in any other way. Pigs are very seldom found as the sole kind of livestock on a farm, whereas cattle frequently are.

Production of creamery butter from herds managed in the way outlined is an integral part of the system. It is not, however, as important a product as either beef or bacon for the reason that, to export it in large quantities, brings us immediately into direct competition with other empire countries and foreign countries as well, most of which, because of better natural conditions, can produce butter much more cheaply than we can. On the other hand, the export of grain fed baby beef, a special product either alive or in the carcass, would meet with practically no serious competition from any source. Canadian bacon, although having to meet keen competition, is sold in Britain under favorable trade agreements. These three lines of production cannot be successfully separated. No one of them can be isolated and easily made to pay under ordinary farm conditions, but must, because of their direct dependence on each other, be carried on simultaneously as parts of a complete programme.

Then we have sheep raising. The sheep is relegated to fourth place among the meat-producing animals kept on farms for the following reasons:

1. They live to a very large extent on pasture and roughage, requiring only a minimum of grain.
2. They are unable to compete successfully in the economy of animal production on the best and most productive of our arable lands with other forms of livestock enterprises.
3. Their proper place is on the marginal lands of all countries where they can and do compete successfully with other kinds of livestock.
4. If we endeavor to compete on the export market with Canadian lamb, we must meet the competition of other Empire countries much better equipped naturally for the production of this product than is Canada.

In this address, I have undertaken to examine and analyse to some extent the agricultural possibilities in the Prairie provinces, I have endeavored to bring out the fact that agricultural production in all countries is dependent primarily for its success upon environmental or natural conditions; that in Western Canada, these natural conditions control to a greater extent than is generally realized our agricultural production, and that because of these facts the alternatives to present farm practices are limited.

This being the case, I am inclined to the belief that the ultimate solution lies, not in restrictive measures applied to grain production, but rather in the direction of a change in our methods of production and marketing in order that a greater diversity of agricultural products suitable for export may be developed.

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